

## WHAT IS CLAIMED IS:

1. An emulsion comprising:
  - a wax component comprising a nonsaponifiable wax and a saponified wax;
  - an alkyl phenol component;
  - a dispersant/surfactant;
  - a carboxymethylcellulose component; and
  - water.
2. The emulsion of claim 1 wherein the wax component comprises about 25% to about 50% of the emulsion, by weight.
3. The emulsion of claim 6 wherein the wax component comprises about 30% to about 40% of the emulsion, by weight.
4. The emulsion of claim 1 wherein the nonsaponifiable wax is a slack wax, a scale wax, a paraffin wax or a combination thereof.
5. The emulsion of claim 1 wherein the saponified wax is produced by reaction of a saponifiable wax with ammonium hydroxide, an alkali metal hydroxide or a combination thereof.
6. The emulsion of claim 5 comprising a saponified wax produced by reaction of a saponifiable wax with potassium hydroxide or sodium hydroxide.
7. The emulsion of claim 5 comprising a saponified wax produced by reaction of a saponifiable wax with ammonium hydroxide.

8. The emulsion of claim 1 wherein the alkyl phenol component comprises a C<sub>20</sub> – C<sub>42</sub> alkyl group.
9. The emulsion of claim 1 wherein the alkyl phenol component comprises a C<sub>24</sub> – C<sub>34</sub> alkyl group.
10. The emulsion of claim 1 wherein the alkyl phenol component comprises a C<sub>24</sub> – C<sub>28</sub> alkyl group.
11. The emulsion of claim 1 wherein the dispersant/surfactant comprises a polynaphthalenesulfonic salt.
12. The emulsion of claim 1 wherein the alkyl phenol component comprises an alkyl phenol having an alkyl group that has an average carbon chain length that matches the carbon chain length of the carboxymethylcellulose.
13. The emulsion of claim 1, wherein
  - the nonsaponifiable wax comprises about 33% to about 35% of the emulsion, by weight;
  - the saponified wax comprises about 3% to about 5% of the emulsion, by weight;
  - the alkyl phenol component comprises about 0.5% to about 2.5% of the emulsion, by weight;
  - the dispersant/surfactant comprises about 0.5% to about 2% of the emulsion, by weight; and
  - the carboxymethylcellulose component comprises about 0.2% to about 5% of the emulsion, by weight.

14. The emulsion of claim 13 wherein the saponified wax is produced by a reaction of a saponifiable wax with ammonium hydroxide, and further comprising about 0.5% formaldehyde, by weight.
15. A method for improving the water resistance of a lignocellulosic composite product prepared by mixing lignocellulosic material with a binder to form a mixture and solidifying the mixture in a selected configuration to form the composite product, the method comprising adding to the mixture an emulsion as defined in claim 1.
16. The method of claim 15 wherein the binder comprises a phenolic resin, the method comprising adding about 1% of the emulsion based on the volume of the resin.
17. A method for improving the water resistance of a lignocellulosic composite product prepared by mixing lignocellulosic material with a binder to form a mixture and solidifying the mixture in a selected configuration to form the composite product, the method comprising adding to the mixture an emulsion as defined in claim 13.
18. The method of claim 17 wherein the binder comprises a phenolic resin, the method comprising adding about 1% of the emulsion based on the volume of the resin.
19. A lignocellulosic composite product made by mixing lignocellulosic material with a binder to form a mixture, adding to the mixture an emulsion comprising a wax component comprising a nonsaponifiable wax and a saponified wax, an alkyl phenol component, a dispersant/surfactant, a carboxymethylcellulose component, and water, and solidifying the mixture in a selected configuration to form the composite product.

20. The lignocellulosic product of claim 20 wherein the nonsaponifiable wax comprises about 33% to about 35% of the emulsion, by weight, the saponified wax comprises about 3% to about 5% of the emulsion, by weight, the alkyl phenol component comprises about 0.5% to about 2.5% of the emulsion, by weight, the dispersant/surfactant comprises about 0.5% to about 2% of the emulsion, by weight, and the carboxymethylcellulose component comprises about 0.2% to about 5% of the emulsion, by weight.

21. A method for treating wood, comprising impregnating the wood with an emulsion comprising a wax component comprising a nonsaponifiable wax and a saponified wax, an alkyl phenol component, a dispersant/surfactant, a carboxymethylcellulose component, and water.

22. The method of claim 21 wherein the wood is a northern species wood and wherein the emulsion comprises a saponified wax produced by the reaction of a saponifiable wax with ammonium hydroxide.

23. The method of claim 21 wherein the nonsaponifiable wax comprises about 33% to about 35% of the emulsion, by weight, the saponified wax comprises about 3% to about 5% of the emulsion, by weight, the alkyl phenol component comprises about 0.5% to about 2.5% of the emulsion, by weight, the dispersant/surfactant comprises about 0.5% to about 2% of the emulsion, by weight, and the carboxymethylcellulose component comprises about 0.2% to about 5% of the emulsion, by weight.

24. The method of claim 23 wherein the wood is a northern species wood and wherein the emulsion comprises a saponified wax produced by the reaction of a saponifiable wax with ammonium hydroxide.

25. The method of claim 21 comprising impregnating the wood with a preservative solution comprising a preservative and said emulsion in a carrier solvent, and removing carrier solvent from the lignocellulosic product.
26. The method of claim 25 wherein impregnating the wood comprises placing the wood in a chamber, depressurizing the chamber, adding the preservative solution to the chamber in contact with the wood and re-pressurizing the chamber.
27. The method of claim 25 wherein removing carrier solvent comprises depressurizing the chamber.
28. The method of claim 25 wherein the preservative solution contains about 1% to about 5% emulsion by weight.
29. The method of claim 28 wherein the preservative solution contains about 1% to about 2% emulsion by weight.
30. The method of claim 28 wherein the preservative comprises a copper compound.
31. The method of claim 30 wherein the preservative comprises ACQ.
32. Lumber comprising the wood treated according to the method of claim 25.
33. A method for making an emulsion, the method comprising:  
charging a single vessel with a molten nonsaponifiable wax, a saponifiable wax, alkyl phenol, water, dispersant/surfactant, a saponifier and carboxymethylcellulose to form a mixture; and  
heating, agitating and homogenizing the mixture.

34. The method of claim 33 comprising charging the vessel with the molten nonsaponifiable wax, saponifiable wax, alkyl phenol component and water to form a first mixture; agitating the first mixture; adding dispersant/surfactant, saponifier and carboxymethylcellulose to form a second mixture, and heating, agitating and homogenizing the second mixture.
35. The method of claim 33 further comprising cooling the emulsion to ambient temperature.
36. The method of claim 35 comprising cooling the emulsion in a process that provides two exotherms.
37. The method of claim 33 comprising charging the saponifiable wax in a quantity that comprises about 33% to about 35% of the emulsion, by weight;  
comprising charging the saponifier in a quantity that comprises about 0.5% to about 1.5% of the emulsion, by weight;  
comprising charging the alkyl phenol component in a quantity that comprises about 0.5% to about 2.5% of the emulsion, by weight;  
comprising charging the dispersant/surfactant in a quantity that comprises about 0.5% to about 2% of the emulsion, by weight; and  
comprising charging the carboxymethylcellulose in a quantity that comprises about 0.2% to about 5% of the emulsion, by weight.
38. The method of claim 37 further comprising cooling the emulsion to ambient temperature.
39. The method of claim 38 comprising cooling the emulsion in a process that provides two exotherms.

40. The method of claim 33 comprising matching the carbon chain length of the alkyl phenol component to the carbon chain length of the carboxymethylcellulose.